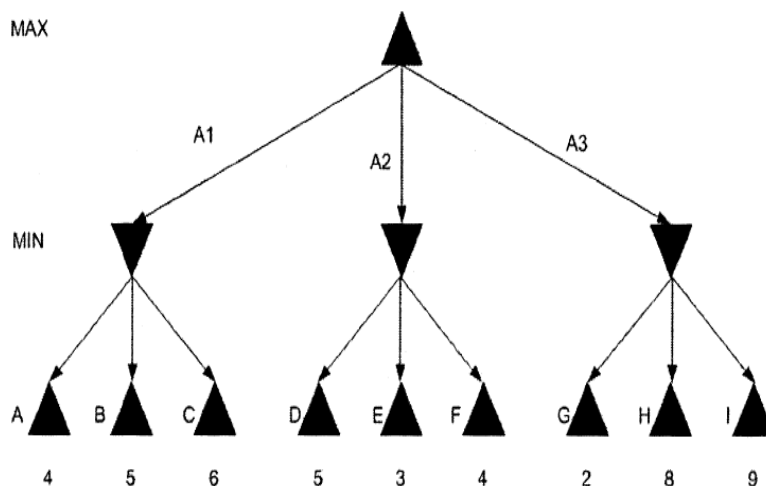


Q1: For each of the following, please circle the letter introducing the best answer.

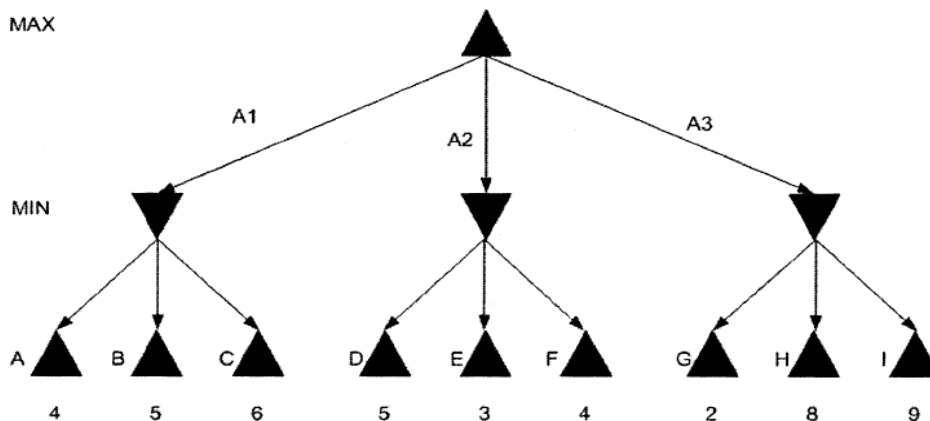
1. Consider the following part of a two-player game tree.



What will be the value of the top MAX node

- (a) 4
- (b) 6
- (c) 8
- (d) 9

2. Once again consider the two-player game tree of part 1.



Assume one applies alpha-beta pruning. Which of the following collection of nodes will **all not** being explored?

- (a) {A, D, G}
- (b) {G, H, I}
- (c) {C, F, I}
- (d) {F, H, I}

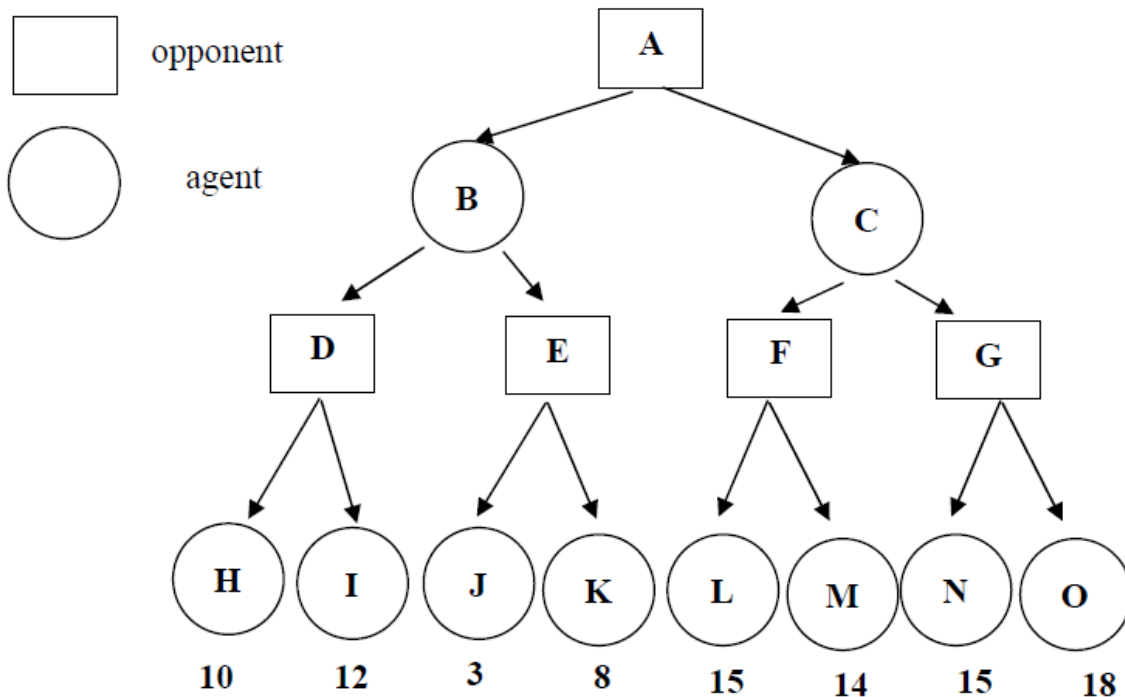
Q2: Nim is a two-player game. The game starts with a single stack of 7 tokens. At each move a player selects one stack and divides it into two non-empty, non-equal stacks. A player who is unable to move loses the game.

(a) Draw the complete search tree for nim.

(b) Assume two players, min and max, play nim (as described above). **Min plays first.** If a terminal state in the search tree developed above is a win for min, a utility function of zero is assigned to that state. A utility function of 1 is assigned to a state if max wins the game. Apply the min-max algorithm to the search tree to assign utility functions to all states in the search tree.

(c) If both min and max play a perfect game, who will win? Explain your answer.

(d) Given the following search tree, apply the alpha-beta pruning algorithm to it and show the search tree that would be built by this algorithm. Make sure that you show where the alpha and beta cuts are applied and which parts of the search tree are pruned as a result.



Best wishes
Dr. Sherin El Gokhy